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ABSTRACT

The Basic Mathematics Improvement Component, funded under Title I of the 1965 Elementary Secondary Education Act, served nearly 800 pupils in grades four through nine in 20 high priority inner-city schools. The philosophy behind the program was that high achievement in mathematics correlates highly with the high achievement in other areas, and a person who achieves high in mathematics has two-thirds of the semi-skilled jobs open to him. The component was designed to raise the level of achievement in mathematics of students who were above 80 in IQ but were achieving at least one year below grade level in mathematics on a standardized test. Each component public school was staffed by a certified teacher and each component parochial school had a part-time certified teacher. Supervision was maintained by a teacher coordinator. The teacher was to meet with small groups of students--four to eight pupils--for approximately 45 minutes a day, four days a week. On the fifth day, the teacher either attended in-service meetings or met individually with students. The maximum number of pupils per teacher during the year was 35. The pupils also attended their regular classroom mathematics program. Component instruction was individualized according to the needs of the individual pupils. (Author/JM)

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FINAL REPORT

1970-71 BASIC MATHEMATICS

IMPROVEMENT COMPONENT

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TITLE I ESEA
BASIC MATHEMATICS IMPROVEMENT COMPONENT

Abstract
1970-71

	Public	Non-Public	Total
Pupils	591	45	636
Schools	17	3	20
Teachers	17	2	19
Cost (Approx.)			$ 248,300

Description: The Basic Mathematics Improvement Component served nearly 800 pupils in grades four through nine in twenty high priority inner-city schools. The source of funds for the component was provided through Title I of the Elementary and Secondary Education Act of 1965.

The philosophy behind the program was that high achievement in mathematics correlates highly with the high achievement in other areas, and a person who achieves highly in mathematics has two-thirds of the semi-skilled jobs open to him.

The Basic Mathematics Improvement Component was designed to raise the level of achievement in mathematics of students who were above 80 in I.Q. but were achieving at least one year below grade level in mathematics on a standardized test.

Each component public school was staffed by a certified teacher and each component parochial school had a part-time certified teacher. Supervision was maintained by a teacher coordinator who supervised four-fifths of the time and taught in a parochial school one-fifth of the time.

Time Interval: The component operated from September, 1970 to mid-June, 1971.

Activities: The teacher was to meet with small groups of students (4 to 8 pupils) for approximately 45 minutes a day, 4 days a week. On the fifth day, the teacher either attended in-service meetings or met individually with students. The maximum number of pupils a teacher had at any one time during the year was 35. The pupils also attended their regular class-

room mathematics program.

Component instruction was individualized according to the needs of the individual pupils. Guided discovery and heuristic teaching approaches were favored by the teachers. It was hoped that transfer of learning would occur if emphasis was placed on basic concepts, generalizations and processes of inquiry.

Objectives:

- To help the underachieving mathematics pupil make satisfactory progress toward raising his level of grade placement in mathematical computation, concepts, and applications.

- To help the underachieving mathematics pupil become successful in his regular classwork.

Evaluation Strategy: Although the Basic Mathematics Improvement Component served 636 pupils, the evaluation of the component consisted only in assessing the performance of pupils who were enrolled in the public schools. The pupils' performance was assessed in two ways: The California Test of Basic Skills (CTBS) and the collection of final average grades. The pupils were administered the CTBS in October, 1970 and later in May, 1971. The final grades were gathered through a locally constructed instrument during the final week of the regular school year.

Results: The CTBS mathematics section consists of three subsections: computation, concepts, applications.

The pre-test, post-test analysis indicated that the frequency of pupils surpassing normal expectations decreased from computation to concepts to applications. The component achieved the objective of raising participants' grade level in computation, concepts and application. Sixty percent of the component enrollees achieved above expectation in any combination of two of the three areas (computation, concepts, application).

Of the elementary mathematics improvement participants, 95.0 percent received passing final grades. Of the junior high participants, 83.3 percent received final passing grades. It was desired that 90 percent of the participants receive passing grades to call the component successful. The component was successful in the elementary grades. It is to be noted that the percentage of pupils who received passing final grades in junior high increased 13 percent during the 1970-71 school year as compared to the 1969-70 school year.

Conclusions: The data indicated that a high percentage of component enrollees improved in the achievement areas of computation, concepts and application. Since measurable achievement in mathematics has a high positive correlation with increased achievement in other disciplines, it would be reasonable to assume that a high percentage of component enrollees have attained a higher level of achievement in other subject areas.

Despite the apparent gains made by many of the component participants, the post-test level of achievement indicated that some of the pupils are still in need of additional instruction; that is, despite the fact that notable gains were made on the CTBS, in some instances the level of achievement was still markedly behind the norms for each grade level. In addition, deficiencies tended to be greater at the upper grade levels.

Recommendations:

The junior high setting in Columbus and its relationship to the Basic Mathematics Improvement Component has to be examined completely. This examination should review all aspects of the component, i.e., objectives, tactics, media, evaluation, etc. to determine if the efforts of the component at the junior high level should be divorced from the efforts of the component at the elementary level. This examination should also attempt to determine what influences there are on component pupils in relation to their individual efforts in the component.

The Department of Evaluation, Research and Planning should investigate causes for the decrease in the number of pupils improving in the mathematical achievement areas of concepts and application.

The Department of Evaluation, Research and Planning should investigate the reasons for component success with a higher percentage of fifth and sixth grade pupils than fourth grade pupils.

Pupils who demonstrated deficiencies at the end of the component should continue in the Basic Mathematics Improvement Component this coming school year (1971-72).

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FINAL REPORT
1970-71 BASIC MATHEMATICS
IMPROVEMENT COMPONENT

SECTION I - OBJECTIVES OF THE EVALUATION

A. Audiences to be Served

This report is written in order that Basic Mathematics Improvement Component teachers, administrative personnel in the Department of Special Program Development of the Division of Instruction, and the members of the Board of Education may become informed about the nature of the outcome of the 1970-71 Basic Mathematics Improvement Component.

B. Educational Philosophy and Goals of the Component

The philosophy behind the Basic Mathematics Improvement Program is stated in the 1969-70 Project Narrative Section of the Language Development and Mathematics Improvement Funding Proposal:

> Low levels of both achievement and interest in the instructional program have generally been shown to be the principal reasons for students' dislike of school. Ultimately, if not corrected, these conditions contribute to school dropouts. Because of the very nature of mathematics and because of some of the promising new methods of teaching this subject, there are hopeful prospects of improving levels of achievement and interest for many disadvantaged pupils.
>
> Training in mathematics, along with some degree of competence, gives a student a much broader choice of types of vocational training in the late secondary school or post-secondary technical-training institutions. Two-thirds of the skilled job opportunities on the labor market today are not available to those who lack an understanding of the basic principles of arithmetic, elementary algebra, and geometry. Basic mathematical understandings are also essential to adult retraining programs for the unemployed.
>
> Success or measurable achievement in mathematics has a close correlation with increased achievement in other disciplines. Other disciplines may profit from the patterns evolved as mathematics programs for the underachiever become more effective.

C. Behavioral Objectives of the Component

The Basic Mathematics Improvement Component had the following objectives:

Objective 1. To help the underachieving mathematics pupil make satisfactory progress toward raising his level of grade placement in mathematical computation, concepts, and application.

Objective 2. To help the underachieving mathematics pupil become successful in his regular classwork.

SECTION II - ORGANIZATION OF THE COMPONENT

A. Schools Served

Seventeen public schools of the Columbus Public School District and three diocesan schools were served by this component. Fourteen of the public schools were elementary schools. These included Beatty Park, Beck Street, Douglas, Fair Avenue, Felton, Garfield Avenue, Lincoln Park, Livingston Avenue, Main Street, Milo, Ohio Avenue, Sullivant Avenue, Weinland Park, and Windsor. The other three schools were junior high schools. These included Franklin, Linmoor, and Monroe. The three diocesan schools were St.Dominic, Sacred Heart, and St.Aloysius.

B. Selection of Students

Pupils were selected by the various mathematics improvement teachers. Regular classroom teachers recommended pupils who experienced difficulty in their classrooms in mathematics and were likely to benefit from additional help. Mathematics improvement teachers reviewed the records of pupils suggested for participation to obtain an assessment of their general intelligence and level of mathematics achievement. The pupils were then tested with the Basic Mathematics Improvement Component Computations Test.

Those pupils who scored the greatest below grade level placement and whose records indicated a discrepancy between achievement and general intelligence were selected for participation in the component. A total of 35 pupils in each building were selected for participation in the component. In general, a pupil selected for the component was at least one year behind his grade level placement in mathematics and had an Intelligence Quotient (I.Q.) of at least 80. Component teachers were not permitted to teach more than 50 pupils all year.

C. Staff

Each component public school had a full time teacher. The teacher conducted sessions with small groups of students(4 to 8 pupils) for approximately 45 minutes a day, 4 days a week. On the fifth day, the teacher either attended in-service meetings or met individually with students. The maximum number of pupils a teacher had at any one time during the year was 35.

All teachers in the component held at least a bachelor's degree. All teachers in the component performed the following duties:

1. assumed duties normally expected of members of the professional staff of the Columbus Public Schools,

2. selected pupils to participate in the component (maximum of 50 pupils per school for the school year),

3. developed programs which would best facilitate the realization of the objectives of the component for all pupils,

4. maintained records for both the operation and evaluation of the component,

5. cooperated with the evaluation team, and

6. assumed professional responsibility for active participation.

The component was supervised by a teacher who taught mathematics improvement classes one-fifth time and supervised the component four-fifths time. Supervisory duties consisted of the following:

1. organizing and providing for the orientation of component staff personnel,

2. providing leadership in developing professional growth programs for in-service teachers and staff personnel,

3. selecting materials and facilitating their use,

4. assisting with records and data relating to the planning, development, operation, and evaluation of the component, and

5. working directly with teachers in helping them improve their teaching performance.

D. Staff Development - In-Service Programs

The in-service program for the professional staff of the Basic Mathematics Improvement Component was conducted in three directions:

1. guest speakers presented ideas to the component professional staff,

2. the component teachers related their experiences with other component teachers, and

3. a series of component teachers' visitations to other component teachers' classrooms was conducted.

The component teachers conducted professional meetings approximately once a month. The meetings were planned to include either a guest speaker recognized in the area of mathematics or individual component teachers or a group of component teachers relating their experiences as to what teaching strategies succeeded or failed on certain mathematical topics.

If a guest speaker was invited to the meeting, this person usually spoke in the morning on some topic in mathematics. In the afternoon, the guest speaker conducted a workshop in which the component teachers participated. When a component teacher (or teachers) was the feature, the meeting lasted approximately a half-day. During these meetings, ideas on topics were exchanged freely. These meetings never lacked direction.

During the months of November and December a series of component teacher visitations were conducted. The visitations were scheduled for either the morning or the afternoon. Generally, a new component teacher was scheduled for four visitations while an experienced component teacher was scheduled for three visitations.

The objectives of the visitation program were to familiarize the new teachers to the classroom procedures of the component and to better coordinate a unified effort in improving achievement of underachieving pupils. The component teachers were favorable to the visitation program.

E. Component Instructional Procedures, Methods, Media

Mathematics improvement classes met on a regular basis throughout the thirty-nine week school year in each of the participating schools. Pupils met in small groups of four to eight pupils on an average of four 45 minute periods per week. Component pupils continued to participate in their regular mathematics classes.

The following philosophy was used for instructional tactics. The eight points are quoted from the 1968 publication of Basic Mathematics Improvement - The Columbus Public Schools:

1. The traditional readiness concept of deferment of instruction until children mature is rejected in favor of the principle that pupils can, with proper conditions, be introduced to a subject as early as desired. Two important conditions would be that it is presented properly and that the pupils have, or are provided with, an adequate background of experience.

2. Transfer of learning and future learning are enhanced when emphasis is given to basic concepts, generalizations, and processes of inquiry which have wide applicability.

3. The guided discovery of relationships by the pupil results in more efficient and permanent learning than do didactic approaches in which children learn about the conclusions reached by others.

4. Interest and motivation may be generated through the lure of discovery within the subject itself if pupils are guided to raise questions, discover relationships, interpret findings, formulate principles, and engage in other aspects of inquiry.

5. Meaningful verbal learning involves the organizing of facts into conceptual systems which can be used to generate ideas, raise questions, or make new interpretations.

6. Inductive approaches are favored because of their value in promoting discovery through inquiry and in giving experience in formulating generalizations; but deductive approaches are evident in experiences designed to develop skill in explaining new facts, formulating hypotheses, making inferences, and interpreting information.

7. The in-depth study of selected topics is more conclusive to the discovery of relationships than is a superficial coverage of masses of material.

8. Depth and breadth of learning are attained through recurring encounters with concepts, processes, theories, models, and generalizations on higher cognitive levels and in new contexts.

In the spring, 1971, two component professional staff members, Sally Allen and Virginia Kaiser, developed an instrument concerning the versatility of component materials. The members of the professional component staff were surveyed and the results summarized. The results were used for future planning of the component. The summary of the results is contained in the Appendix of this report.

SECTION III - EVALUATION PROCEDURES

A. Design for the Evaluation of the Component

Both objectives of the component are listed below, followed by the design for each objective. The design includes the instrumentation, sample, administration of instruments, and analysis.

Objective 1. To help the underachieving mathematics pupil make satisfactory progress toward raising his level of grade placement in mathematical computations, applications, and concepts.

INSTRUMENTATION

California Test of Basic Skills (mathematics subtest)

Sample: All public school component enrollees as of May, 1971.

Administration: Pre-post test administrations in October, 1970 and May, 1971.

Analysis: Frequency distributions by grade level and achievement area.

Objective 2. To help the underachieving mathematics pupil become successful in his regular classwork.

INSTRUMENTATION

Locally constructed instrument.

Sample: All public school component enrollees during the regular school year 1970-71.

Administration: Local instrument administered to component teachers in June, 1971.

Analysis: Frequency distribution by grade level and by letter grade.

B. Standards, Bases for Judging Quality

The criterion of each objective is listed after the objective.

Objective 1. To help the underachieving mathematics pupil make satisfactory progress toward raising his level of grade placement in mathematical computations, applications, and concepts.

Criterion: The extent to which the objective is achieved is the percentage of component enrollees who surpassed expected levels of grade placement in at least two of three mathematic achievement areas: computation, concepts, application.

Objective 2. To help the pupil become successful in his regular class.

Criterion: If successful, 90 percent of those enrolled in the component receive a passing grade, i.e., D or better as a final grade in mathematics. Ninety percent is based on the estimated city-wide pass-fail rate in mathematics.

SECTION IV - PROGRAM OUTCOMES

A. Opportunities, Experiences Provided Pupils

The mathematics improvement teacher attempted to help each pupil on two levels:

1. concepts and skills which the pupil was encountering in his regular class;

2. concepts and skills which the pupil should have mastered in earlier grades. The portion of time spent on each of the two levels depended on the severity of the problem of each individual pupil and, therefore, varied from pupil to pupil.

B. Student Gains and Losses

Objective I. To help the underachieving mathematics pupil make satisfactory progress toward raising his level of grade placement in mathematical computations, applications and concepts.

The criterion for measuring Objective I was the percentage of component enrollees who surpassed expected levels of grade placement in at least two of the three mathematics achievement areas previously mentioned. Expected level of grade placement was considered to be the average yearly progression of each pupil in mathematics achievement in addition to his pre-test grade placement, e.g., a fifth grader achieving at 3.5 at entrance in this fifth grade has an average achievement progression of 0.7. His expected grade placement at the end of the fifth grade would be 4.2 (3.5 + 0.7).

Table I organizes the data for examining the extent to which Objective I was achieved. Because a total percentage of the number of component enrollees who surpassed expected levels of grade placement was needed, Table 2 is organized in such a way that all the component pupils within each grade level are divided into four mutually exclusive groups. Group I consists of pupils who surpassed expected levels of grade placement in only computation and concepts. Group II consists of pupils who surpassed expected levels of grade placement in computation and application. Group III consists of pupils who surpassed expected levels of grade placement in concepts and application, and Group IV consists of pupils who surpassed expected levels of grade placement in computation, concepts and application. The areas of computation, concepts and application refer to the mathematics subtests of the California Test of Basic Skills.

A total number of pupils who surpassed expected levels of grade placement in two of three areas is computed by adding the four groups within each grade level. A total percentage of improvement within each grade level is computed by dividing the total number of pupils who surpassed expected levels of grade placement in two of three areas for the grade level by the number of pupils in the component in that grade level (N).

An examination of Table I reveals that within grades 4 - 7 the number of pupils who surpassed normal expectations in computation, concepts and application (Group IV) is greater than the number of pupils who improved in any combination of two of the three areas (Group I, or Group II, or Group III).

In the elementary grades, the percentage range of component enrollees surpassing expected levels of grade placement in at least two of three mathematical areas is nearly ten percent. The percentage ranges from 52.3 percent for fourth graders to 62.1 percent for sixth graders. Between these two percentages, 58.5 percent of the fifth graders achieved greater than expectation in at least two of the three areas of the mathematics subtest

TABLE I

NUMBER AND PERCENTAGE OF COMPONENT ENROLLEES WHO SURPASSED EXPECTED LEVELS OF GRADE PLACEMENT AS MEASURED FROM PRE-TEST TO POST-TEST IN TWO OF THREE AREAS OF THE MATHEMATICS SUBTEST OF THE CALIFORNIA TEST OF BASIC SKILLS

Grade	N[a]	I Improvement in Computation and Concepts	II Improvement in Computation and Applications	III Improvement in Concepts and Applications	IV Improvement in Computation Concepts and Application	Total	Total Percentage of Improvement
4	107	15	13	5	23	56	52.3
5	118	23	12	6	28	69	58.5
6	124	20	12	14	31	77	62.1
7	64	3	8	8	13	32	50.0
8	10	2	3	0	1	6	60.0
Total	423	63	48	33	96	240	59.1

[a]N is for matched pre- and post-test scores.

of the California Test of Basic Skills.

In junior high, 50 percent of the seventh grade component enrollees and 60 percent of the eighth grade component enrollees surpassed expected levels of grade placement in at least two of three areas of the mathematics subtest of the California Test of Basic Skills. However, caution must be used in interpreting the results of the component at the junior high level. There are two reasons for this caution. The first is that the number of pupils measured is small. Only 10 eighth grade component enrollees were measured during the evaluation of the component. The other reason for caution in interpreting results at the junior high level concerns the pupils and the attitudes of the pupils. During the school year, the component was unable to control effects from events related to the school system. As a result, many of the pupils "quit" the component or did not attempt to improve. Many component pupils in junior high did not attempt the post-test. Thus, the small number of measured pupils at the junior high level is a result of this mortality phenomenon. Therefore the measured pupils may not be representative of all the component enrollees.

The component was successful in achieving Objective I -- to help the underachieving mathematics pupil make satisfactory progress toward raising his level of grade placement in mathematical computations, applications, and concepts. Nearly sixty percent of the component enrollees achieved the criteria of Objective I.

In examining Objective I of the Basic Mathematics Improvement Component, the number and percentage of pupils who surpassed normal expectations in each achievement area, computations, concepts and applications, by grade level was easily obtained. This was displayed in Table 2. The number of pupils surpassing normal expectation was tallied and the percentage was computed. The number and percentage of pupils surpassing normal expectation was computed for each achievement area within each grade level. A total number and total percentage was also computed for each achievement area. In examining the data displayed in Table 2, it is apparent that more pupils surpassed normal expectations in computation than in concepts or applications. Overall, sixty-eight percent of the component pupils surpassed normal expectations in computation. Similarly, fifty-one percent and forty-eight percent of the component enrollees respectively surpassed normal expectations in concepts and applications.

At the elementary level the component appeared to benefit sixth grade enrollees more than fourth or fifth grade enrollees.

At least fifty percent of the sixth grade component enrollees surpassed expected levels of achievement in each of the three achievement areas of computation, concepts, and application. Of the 124 sixth grade component enrollees, 70 percent (n = 87) achieved above expectation in computation, 57 percent (n = 71) achieved above expectation in concepts, and 50 percent (n = 62) achieved above expectation in application.

TABLE 2

NUMBER AND PERCENTAGE OF COMPONENT ENROLLEES BY GRADE LEVEL
WHO SURPASSED NORMAL EXPECTATIONS OF ACHIEVEMENT
IN THE THREE AREAS OF THE MATHEMATICS SUBTEST OF THE
CALIFORNIA TEST OF BASIC SKILLS

Grade	N[a]	Computation		Concepts		Application	
		n[b]	(%)	n	(%)	n	(%)
4	107	74	(69)	47	(43)	55	(51)
5	118	87	(73)	67	(56)	48	(40)
6	124	87	(70)	71	(57)	62	(50)
7	64	33	(51)	30	(46)	34	(53)
8	10	8	(80)	4	(40)	4	(40)
Total	423	289	(68)	219	(51)	204	(48)

[a]N is for matched pre- and post-test scores

[b]n represents the number of enrollees surpassing expectancy by sub-test and are duplicated counts of enrollees. As such the n's will not sum to N.

A majority of fourth grade and fifth grade component enrollees achieved above expectation in two of the three areas. A majority of fourth grade component enrollees achieved above normal expectation in computation (69 percent) and application (51 percent). A majority of fifth grade component enrollees achieved above normal expectation in computation (73 percent) and concepts (56 percent).

Conversely, the data may be examined to discover the number and percentage of component enrollees who did not surpass expected levels of grade placement in any one of the three achievement areas. Table 3 displays the data this way. With the exception of seventh grade, the percentage of component enrollees not displaying achievement gains in either computations, concepts or application ranges between 9.3 to 11 percent. In seventh grade, 18.5 percent of the component enrollees displayed no achievement gains. Once again cautious interpretation of the seventh grade data is needed because of the small number of measured enrollees and the component's inability to control outside events.

Overall, 11.3 percent of the component enrollees failed to surpass expected levels of grade placement in either computations, concepts and application. The failure rate in mathematics across the Columbus School System is 10 percent. If the standard error of the California Test of Basic Skills is considered, the 11.3 percent of non-achieving component enrollees compares favorably with the failure rate across the school system. Therefore, the component has benefitted approximately 90 percent of the component enrollees; that is, almost nine out of ten component enrollees achieved above normal expectations in one of the achievement areas of computation, concepts, or applications.

TABLE 3

NUMBER AND PERCENTAGE OF COMPONENT ENROLLEES
BY GRADE LEVEL WHO DID NOT SURPASS NORMAL EXPECTATIONS
OF ACHIEVEMENT IN EITHER OF THE MATHEMATICS AREAS
OF COMPUTATIONS, CONCEPTS, OR APPLICATIONS

Grade	N	Number	Percent
4	107	10	9.3
5	118	13	11.0
6	124	12	9.7
7	64	12	18.8
8	10	1	10.0
Total	423	48	11.3

N is for matched Pre- and Post-Test scores.

Objective 2. To help the pupil become successful in his regular class.

Final grades were collected to determine if the component achieved Objective 2. The criterion for the objective was that 90 percent of the component enrollees had to receive a final passing grade, i.e., D or better in their regular mathematics class.

Final grades for 456 participants in mathematics improvement classes were collected and compiled. Grades of "F" for pupils in grades four through eight constituted 7.1% of the total number of grades received by component participants; 92.9 percent received grades of "D" or better. For grades four, five, and six, 95 percent of the pupils enrolled in mathematics improvement classes received grades of "D" or better. Grades of "D" or better were received by 83.1 percent of the seventh and eighth grade pupils enrolled in mathematics improvement classes. This data is presented in Table 4.

TABLE 4

FINAL GRADES RECEIVED BY PARTICIPANTS IN BASIC MATHEMATICS IMPROVEMENT COMPONENT BY LETTER GRADE AND GRADE LEVEL

Grade Level	Letter Grade A	B	C	D	F	Total
4	1	18	53	29	11	112
5	3	24	69	32	2	130
6	4	29	58	44	6	141
7	2	11	18	26	12	69
8	0	3	7	2	2	14
Total	10	85	205	133	33	466

Total Failures: 33 or 7.1 percent (N = 466)

Failures at Elementary Level: 19 or 5.0 percent (N = 383)

Failures at Junior High Level: 14 or 16.9 percent (N = 83)

The component attained the objective overall at the elementary level. However, the component did not attain the objective at the junior high level. It is significant to note the improvement made by the com-

ponent in helping component pupils become successful in their regular classroom work. Table 5 displays this improvement. Less component pupils failed at the elementary, junior high, and total levels during the 1970-71 school year than in either the 1968-69 school year or the 1969-70 school year. During these three school years the component was always successful at the elementary level. However, the percentage of pupils failing decreased from 7.2 percent during the 1968-69 school year to 5 percent during the 1970-71 school year.

At the junior high level this decrease is more dramatic. During the 1968-69 school year 30.6 percent of the junior high component enrollees failed in their regular mathematics classwork. In contrast, during the 1970-71 school year, 16.9 percent of the component enrollees failed in their regular mathematics classwork. This is a decrease of 13.1 percent at the junior high level.

Across the total component, 1970-71 was the only year of the past three years that the component achieved the objective. During the 1968-69 school year, 13.1 percent of all the component enrollees failed in their regular mathematics classwork; during 1969-70 school year, 14.3 percent of all the component enrollees failed in their regular mathematics classwork. During the 1970-71 school year, 7.1 percent of all the component enrollees failed in their regular mathematic classwork.

TABLE 5

PERCENTAGE OF COMPONENT ENROLLEES WHO FAILED REGULAR CLASSROOM MATHEMATICS WORK; ORGANIZED BY SCHOOL YEAR AND SCHOOL LEVEL

Level	School Year 1968-69 %	1969-70 %	1970-71 %
Elementary	7.2	10.5	5.0
Junior High	30.6	29.6	16.9
Total	13.1	14.3	7.1

Two reasons seem to explain the decrease in the percentage of failures over the last three years. The first reason is that the data was collected differently during the 1970-71 year than in the previous two years. This past year the Basic Mathematics Improvement teachers collected the final classroom grades of their pupils. In the past, the evaluation specialist for the project collected the grades. Frequently, the evaluation specialist would not be able to examine the pupil's permanent records for the pupil's final grade. Instead he would have to examine the school register and

"determine" the final grade. The school register contains the pupils' grades for each six-weeks period. However, it does not have a final grade. The evaluation specialist would have to "guess" this. With the Basic Mathematics Improvement teacher collecting final grades, efficiency of procedure and reliability of data was increased.

The other reason for the decrease in the percentage of component enrollees who failed mathematics classroom work is that many pupils are experiencing the component for a second and third time. It has been a policy of the component to select pupils who experienced the component the previous year but were not successful. The impact on pupils of repeating the component is not fully known at this time. A separate study is being conducted to determine whether repeating the component improves the pupil's achievement in mathematics.

C. Side Effects and Bonuses

The data generated from the pre-test to post-test of the California Test of Basic Skills may be examined another way to determine side effects and bonuses. This way is to group the data by grade level and define levels of improvement from pre-test to post-test. This enables one to examine the size of achievement gains.

The Ohio State Department of Education defines levels of improvement for the Annual Evaluation of Title I, Fiscal Year 1971 the following way:

Marked Improvement - When a child gains 15 months or more, in grade level on a standardized test in the course of 10 month program, he is said to have made "marked improvement."

Improvement - When a student gains between 11 and 14 months in grade level on a standardized test in the course of a 10 month program, he is said to have made "improvement."

Some Improvement - When a child gains between 6 and 10 months in grade level on a standardized test in the course of a 10 month program, he is said to have made "some improvement."

Little or No Improvement - If a child gains 5 months or less in grade level on a standardized test during the course of a 10 month program, he is said to have made "little or no improvement."

With these definitions, the growth of the pupils in the three sections of the mathematics subtest of the CTBS can be examined in more detail.

Computation: Table 6 illustrates the degree of improvement by the component pupils in computation. Approximately forty-two percent (178 out of 421) of the component enrollees improved their computational skills by fifteen months or better. Conversely, twenty-two percent (92 out of 423) of the component enrollees demonstrated less than five months growth in achievement during the ten month component.

In every grade level except seventh, more component pupils demonstrated marked improvement than any other degree of improvement. In grades 4-6, the ratio of component pupils demonstrating marked improvement compared to component pupils demonstrating little or no improvement is at least 2 to 1. In the fifth grade, this ratio is nearly 3 to 1.

TABLE 6

FREQUENCY COUNT OF THE AMOUNT OF IMPROVEMENT FROM PRE-TEST TO POST-TEST OF PARTICIPANTS IN THE BASIC MATHEMATICS IMPROVEMENT COMPONENT ON THE CALIFORNIA TEST OF BASIC SKILLS, COMPUTATIONAL SECTION, MATHEMATICS SUBTEST

	Frequency				
Grade	Marked Improvement	Improvement	Some Improvement	Little or No Improvement	Total
4	41	24	25	17	107
5	56	24	19	19	118
6	60	16	24	23	123
7	18	7	8	31	64
8	3	4	2	2	11
Total	178	75	78	92	423

Concepts: Table 7 illustrates the amount of improvement in concepts. Totally, more pupils demonstrated little or no improvement than any other type of improvement. However, 262 component pupils demonstrated at least some improvement (greater than five months gain in achievement grade placement). There were 161 component pupils that demonstrated little or no improvement.

Within each grade level, more pupils demonstrated little or no improvement in achievement than in any other individual category. However in the fifth and sixth grades, frequencies of pupils in the category of marked improvement are nearly similar to the frequencies in little or no improvement.

TABLE 7

FREQUENCY COUNT OF THE AMOUNT OF IMPROVEMENT FROM PRE-TEST TO POST-TEST OF PARTICIPANTS IN THE BASIC MATHEMATICS IMPROVEMENT COMPONENT ON THE CALIFORNIA TEST OF BASIC SKILLS, CONCEPTS SECTION, MATHEMATICS SUBTEST

	Frequency				
Grade	Marked Improvement	Improvement	Some Improvement	Little or No Improvement	Total
4	24	10	26	47	107
5	40	10	27	41	118
6	33	18	32	40	123
7	15	6	15	28	64
8	2	0	4	5	11
Total	114	44	104	161	423

Applications: Table 8 illustrated the frequency of improvement in application. Forty-five percent (191 out of 423) of the component enrollees exhibited little or no improvement in achievement in application. In every grade there were more pupils demonstrating little or no improvement than pupils demonstrating any of the other improvement classifications.

TABLE 8

FREQUENCY COUNT OF THE AMOUNT OF IMPROVEMENT FROM PRE-TEST TO POST-TEST OF PARTICIPANTS IN THE BASIC MATHEMATICS IMPROVEMENT COMPONENT ON THE CALIFORNIA TEST OF BASIC SKILLS, APPLICATIONS SECTION, MATHEMATICS SUBTEST

	Frequency				
Grade	Marked Improvement	Improvement	Some Improvement	Little or No Improvement	Total
4	23	17	21	46	107
5	32	8	21	57	118
6	31	13	25	54	123
7	23	8	5	28	64
8	0	4	1	6	11
Total	109	50	73	191	423

Computation, Concepts and Application: Table 9 enables comparisons on improvement by grade level and achievement area to be made. The table contains the frequency and percentage of component pupils by grade level and achievement area who have demonstrated at least some improvement. Included in this are the summary frequencies of pupils within each grade level who indicated some improvement, improvement, and marked improvement. The percentage is computed by dividing the frequency (f) by the number of matched pre- and post-test scores (N) for that particular grade level.

In examining Table 9, the percentage of pupils demonstrating at least some improvement across all component grade levels (4-8) within achievement areas varies little but has three exceptions. A smaller percentage of seventh grade component pupils demonstrated at least some improvement in computation than the percentage of component pupils in other grades demonstrating the same achievement in computation. Fifty-two percent of seventh grade component pupils demonstrated at least some improvement in computation while the percentage of component pupils in other grades ranged between 81 and 84 percent.

There is also a large discrepancy in the percentages of fifth and sixth grade component pupils who demonstrated at least some improvement in concepts and the percentages of component pupils in other grades demonstrating the same achievement in concepts. Sixty-five percent of the fifth grade component pupils and sixty-seven percent of the sixth grade component pupils demonstrated at least some improvement in concepts. The

percentages of component pupils in grades 4, 7, and 8 demonstrating the same achievement ranged from 54 percent (eighth grade) to 56 percent (fourth and seventh grades).

TABLE 9

FREQUENCY AND PERCENTAGE OF COMPONENT PUPILS BY GRADE LEVEL AND MATHEMATICS ACHIEVEMENT AREA WHO DEMONSTRATED AT LEAST SOME IMPROVEMENT IN ACHIEVEMENT FROM PRE-TEST TO POST-TEST ON THE CALIFORNIA TEST OF BASIC SKILLS; REGULAR SCHOOL YEAR 1970-71

Grade Level	N[a]	Achievement Area: Computation f	Computation %	Concepts f	Concepts %	Applications f	Applications %
4	107	90	84	60	56	61	57
5	118	99	84	77	65	61	52
6	123	100	81	83	67	69	56
7	64	33	52	36	56	36	56
8	11	9	82	6	54	5	45
Total	423	331	78	262	62	232	55

[a]N is for matched pre- and post-test scores.

It is difficult to explain these three exceptions while examining Table 9. The explanations already accounting for lower component success at the junior high level could suffice for reasons why a small percentage of seventh grade component pupils demonstrated at least some improvement in computation. The more difficult question to answer is, "Why are there more component pupils in fifth and sixth grades demonstrating at least some improvement in concepts than there are component pupils in the other three grade levels?" If this same discrepancy among grade levels had appeared in the area of application then there could be an explanation. If the above were true, the reading ability of the component pupils would be a variable to consider. The concepts and application parts of the California Test of Basic Skills require a degree of reading ability by the pupils. One could say, if the situation described above were true, that the increased reading ability by the fifth and sixth grade pupils caused the discrepancy. However, the above situation is not true. The discrepancy appears only in concepts and not in both concepts and applications. The investigation

into why more fifth and sixth grade component pupils demonstrated at least some improvement compared to other grade levels has to be properly undertaken as soon as possible.

Table 9 also displays data that indicate that the frequency and percentage of pupils in the component decrease from computation to concepts to applications. A majority of component pupils demonstrated at least some improvement in the three achievement areas. The total percentage range of the component was 55 percent in application to 78 percent in computation. Every grade level reflects the total frequencies and percentages of the component, with two exceptions. In seventh grade a smaller percentage of component pupils demonstrated at least some improvement in computation than at least some improvement in concepts and applications. The other exception is with the eighth grade component pupils. Forty-five percent of the eighth grade pupils demonstrated at least some improvement in application. This was the only combination of grade level and achievement area to demonstrate less than fifty percent. However, only eleven pupils constitute the matched pre- and post-test scores group for the eighth grade in Table 9.

SECTION V - JUDGMENT OF WORTH

A. Value of Outcomes

The data indicate that a high percentage of component enrollees improved in the achievement areas of computation, concepts, and application. Since measurable achievement in mathematics has a high positive correlation with increased achievement in other disciplines, it is reasonable to assume that a high percentage of component enrollees have attained a higher level of achievement in other subject areas.

Despite the apparent gains made by many of the component participants, the post-test level of achievement indicates that some of the pupils are still in need of additional instruction. That is, despite the fact that notable gains were made on the California test, in some instances the level of achievement is still markedly behind the norms for each grade level. In addition, deficiencies tend to be greater at the upper grade levels.

B. Recommendations

Examination of the data indicates that the program is accomplishing its objectives. Nearly sixty percent of the 423 component enrollees pre- and post-tested achieved the objective of achieving greater than what was expected in two of the three achievement areas of computation, concepts, and application. The data for the other objective of the program reveals that, overall, 92.9 percent of the component enrollees passed the requirements of their regular mathematics classes. The passing rate in mathematics for the entire Columbus system is 90 percent.

There was, however, large discrepancies in the achievement data between elementary grade component pupils and junior high component pupils. Fifty-

eight percent of the elementary grade pupils achieved higher than expected in two of the three areas of computation, concepts, and applications while fifty-one percent of the junior high pupils achieved the same. Examining final grades of the component pupils reveals that 95 percent of the elementary grade pupils passed mathematics while approximately 83 percent of the junior high pupils did the same.

Throughout this report, conjectures have been made to try to explain the discrepancies. However, there is little concrete evidence to support the conjectures.

Recommendation: The junior high setting in Columbus and its relationship to the Basic Mathematics Improvement Component has to be examined completely. This examination should review all aspects of the component, i.e., objectives, tactics, media, evaluation, etc. to determine if the efforts of the component at the junior high level should be divorced from the efforts of the component at the elementary level. This examination should also attempt to determine what influences there are on component pupils in relation to their individual efforts in the component.

The examination of the amount of improvement of component enrollees in each area (computation, concepts, application) definitely illustrates that most of the improvement occurred in computational skills. Of the 423 component pupils who were pre-tested and post-tested, 331 of the pupils demonstrated six months or more improvement in grade placement on the CTBS in computational skill. Of the same pupils, 262 demonstrated six months or more improvement in grade placement on the CTBS in concepts, and 232 demonstrated six months or more improvement in grade placement on the CTBS in applications.

Another way to discover if most of the improvement occurred in computation is to examine the number of pupils who demonstrated little or no improvement in grade placement on the CTBS in the three areas. Ninety-two pupils indicated little or no improvement in grade placement on the CTBS in computation. On the other hand, 161 pupils indicated little or no improvement in grade placement in the CTBS in concepts, and 191 indicated little or no improvement in grade placement on the CTBS in applications.

Because data from the 1969-70 component indicated the same improvement pattern it was recommended last year that more conceptual and applicative areas of mathematics should be included in the component classroom. The component teachers attempted to follow the recommendation. The improvement pattern of the data for 1970-71, however, is the same as the 1969-70 school year.

Recommendation: The Department of Evaluation, Research and Planning should investigate causes for the decrease in the number of pupils improving in the mathematical achievement areas of concepts and application.

At the elementary level more fifth and sixth grade component pupils surpassed expected levels of grade placement in at least two of the three areas of computation, concepts and application than component pupils in the fourth grade. Approximately 59 percent of the fifth grade component pupils and 62 percent of the sixth grade component pupils surpassed expected levels of grade placement in two of the three achievement areas. This is compared to approximately 52 percent of the fourth grade component pupils doing the same. This fact combined with the facts that less fifth (1.5%) and sixth (4.3%) grade component pupils failed in their regular mathematics class compared to fourth grade (9.8%) component pupils and more fifth and sixth grade component pupils demonstrated at least some improvement in concepts than fourth grade component pupils indicates that the component can improve at the fourth grade level. However, more investigation is needed at this time.

Recommendation: The Department of Evaluation, Research and Planning should investigate the reasons for component success with a higher percentage of fifth and sixth grade pupils than fourth grade pupils.

The failing rates in regular mathematics class of component pupils (although high enough to claim the component successful) indicate that some pupils were not prepared to return to their regular mathematics classes. Individual data of component pupils reveal that some pupils are still achieving below grade level.

Recommendation: Pupils who demonstrated deficiencies at the end of the component should continue in the Basic Mathematics Improvement Component this coming school year (1971-72).

APPENDIX A

SUMMARY OF RESPONSES TO
MATERIALS RATING SCALE

Versatility

1 - Primarily used for concept development

2 - Primarily used for strengthening computational skills

3 - Used for both concept development and computational skills

4 - Never used and/or not available

Desirability

1 - I feel absolutely essential

2 - I believe may or may not be used (is desirable but not essential)

3 - Not essential nor desirable

Category I - Measurement Devices

All these are items which can be used by students to conduct and/or understand measurement.

Versatility Rating					Desirability Rating		
Column:					Column:		
(1)	(2)	(3)	(4)		(1)	(2)	(3)
9	0	6	5	Metal measuring containers (pt., qt., gal., etc.)	11	5	0
4	0	8	7	Produce Scale	7	5	0
5	0	5	9	Thermometers (indoor/outdoor) or one used to record temperature	7	3	0
11	0	8	1	Clock	18	1	0
8	1	11	0	Rulers, yardsticks, meter sticks, etc.	19	1	0

Versatility Rating					Desirability Rating		
3	2	8	7	Steel tape measures	4	10	0
6	3	10	1	Toy money	14	5	0
9	1	2	7	Models (cu.ft.; cu.yd.; etc.)	6	4	2
5	1	1	12	Clinometer	1	4	5
10	1	8	1	Calendar	18	1	0
10	1	4	3	Protractors and Compasses (student size)	12	6	0

Category 2 - Games

All games listed here can be used by two or more students.

Versatility Rating					Desirability Rating		
7	2	8	2	Fractions Are As Easy As Pie	8	8	0
1	11	5	2	The Winning Touch	8	9	0
2	13	3	1	Quizmo (4 operations)	14	4	0
3	4	3	9	Link Numbers	2	7	1
3	7	2	7	Smarty	7	2	2
0	3	7	10	Tuf	4	7	2
7	2	9	1	Kalah	6	10	3
1	5	2	11	Numble	2	2	6
1	7	5	7	Krypto	1	9	4
0	3	3	12	Equations	1	1	5
1	2	1	15	Arithmecubes	1	3	0
15	0	1	4	3-D Tic Tac Toe (or Cubic)	9	7	0
1	2	6	10	I'm Out	1	7	3
2	6	11	1	Heads Up	13	5	1
0	1	3	15	Wiff and Proof	0	1	4
4	2	0	13	Tac-Tickle	2	3	3
2	2	2	13	Real Numbers Game	2	1	4

Category 3 - Locally Prepared Student Materials

This category is meant to include any of the materials which have been prepared by Columbus Public School teachers.

Versatility Rating					Desirability Rating		
2	4	8	6	Tape Recordings	9	3	2
4	2	14	0	Transparencies	15	4	1
5	1	13	1	3-M masters for preparing transparencies and/or ditto spirit masters	15	3	2
4	0	16	0	BMIP teacher-written ditto materials	16	4	0

Category 3 - Locally Prepared Student Materials (Cont'd.)

Versatility Rating					Desirability Rating		
5	1	13	1	Teacher-made charts	18	1	0
2	3	11	4	Teacher-made puzzles	11	5	0
2	3	15	0	Teacher-made games	13	6	1

Category 4 - Puzzles

This category includes puzzles for individual student use.

Versatility Rating					Desirability Rating		
12	2	2	2	Tower Puzzle	4	14	0
5	0	1	12	3-D Wooden puzzles	2	6	1
4	1	0	13	Instant Insanity	3	3	1
7	1	1	10	Tangrams	3	6	0
1	0	0	17	Dr. I. Q.	0	1	0
				Other (please name)			

Category 5 - Room Furnishings

	Desirability Rating		
Study Stations	16	3	0
Clock	17	1	0
Sink	9	4	1
Paper towel supply	12	4	0
Chalkboard	20	0	0
Folding table	8	5	0
Book Case (s)	15	3	0
Letter Tray	9	5	1
Conference table	14	2	1
Storage cabinets	20	0	0
Student chairs	19	0	0
Teacher desk and chair	19	1	0
Individual student desks	9	3	1
4-drawer file	15	0	1
2-drawer file	14	2	0
Projector screen	18	2	0
Bulletin Board	17	1	0
Flannelboard	12	7	0

Category 6 - Equipment

This category is designed to list the non-expendable, "machinery-type" mathematics materials.

Versatility Rating					Desirability Rating		
5	9	6	0	Controlled Reader (EDL)	13	5	2

Category 3 - Locally Prepared Student Materials (Cont'd.)

Versatility Rating					Desirability Rating		
5	1	13	1	Teacher-made charts	18	1	0
2	3	11	4	Teacher-made puzzles	11	5	0
2	3	15	0	Teacher-made games	13	6	1

Category 4 - Puzzles

This category includes puzzles for individual student use.

Versatility Rating					Desirability Rating		
12	2	2	2	Tower Puzzle	4	14	0
5	0	1	12	3-D Wooden puzzles	2	6	1
4	1	0	13	Instant Insanity	3	3	1
7	1	1	10	Tangrams	3	6	0
1	0	0	17	Dr. I. Q.	0	1	0
				Other (please name)			

Category 5 - Room Furnishings

	Desirability Rating		
Study Stations	16	3	0
Clock	17	1	0
Sink	9	4	1
Paper towel supply	12	4	0
Chalkboard	20	0	0
Folding table	8	5	0
Book Case (s)	15	3	0
Letter Tray	9	5	1
Conference table	14	2	1
Storage cabinets	20	0	0
Student chairs	19	0	0
Teacher desk and chair	19	1	0
Individual student desks	9	3	1
4-drawer file	15	0	1
2-drawer file	14	2	0
Projector screen	18	2	0
Bulletin Board	17	1	0
Flannelboard	12	7	0

Category 6 - Equipment

This category is designed to list the non-expendable, "machinery-type" mathematics materials.

Versatility Rating					Desirability Rating		
5	9	6	0	Controlled Reader (EDL)	13	5	2

Versatility Rating					Desirability Rating		
3	1	16	0	Overhead Projector	19	1	0
5	1	14	0	Filmstrip (and slide projector)	12	8	0
1	4	12	3	Tape recorder	9	8	1
2	2	2	13	Earphones	7	2	0
1	11	8	0	Calculator	17	3	0
10	1	4	5	8mm film loop projector	4	11	2

Category 7 - Professional Materials for Teacher Use

Versatility Rating					Desirability Rating		
5	1	7	6	The Low Achiever in Arithmetic (HEW)	10	4	1
5	2	4	8	New Math Booklet (Ideal)	6	6	0
2	3	5	9	Teaching the Culturally Disadvantaged (Kenneth Johnson)	6	6	0
2	1	7	9	The Growth of Mathematical Ideas, K-12 (NCTM)	6	6	0
2	2	9	6	Enrichment Math for the Grades (NCTM)	9	4	0
1	3	15	0	Arithmetic Games & Activities	11	8	0
1	2	17	0	Basic Mathematics Improvement (Columbus Public Schools)	16	3	1

Other Professional Books
(Please give the names of any that you have used and feel are of real value.)

Category 8 - Visual Aids

This category contains items which the teacher can use to physically and/or pictorially show mathematical ideas.

Versatility Rating					Desirability Rating		
4	0	15	1	Large number line (demonstration size)	18	1	0
9	2	5	4	Decimal place value charts	9	6	1
4	3	7	6	100 number chart	7	5	2
7	2	6	5	Equivalent decimal, fraction and percent chart	8	7	1
7	1	6	6	Fraction chart (one with removable fraction pieces)	9	3	2
9	1	2	8	Plane geometric figures (red and white on masonite)	7	4	1
13	1	2	4	Plane and solid geometric figures (plastic or wooden)	8	7	0

Category 8 - Visual Aids (Cont'd.)

Versatility Rating					Desirability Rating		
12	1	6	1	Place value chart	16	2	1
5	7	8	0	EDL filmstrips	12	6	1
3	1	1	15	World Time Dial	1	5	1
4	11	5	0	Double Value Flash Cards (4 operations)	13	6	1
7	0	11	1	Filmstrips	13	5	0
4	2	11	3	SVE Strips	12	5	0
1	2	5	11	American Book Company Strips	4	3	3
2	0	7	9	John Colburn Strips	3	4	2
2	0	6	10	McGraw-Hill Strips	6	2	0
5	1	3	9	Commercially-made transparencies	1	7	2
11	2	4	3	Cardboard Clock	9	6	2
4	1	9	4	Locally-made transparencies	9	3	1
7	1	1	9	Cu.ft.model	4	4	0
7	0	1	11	Giant ruler	5	2	0
5	2	4	8	Cardboard demonstration thermometer	4	6	0
11	1	3	5	8mm Film Loops (There are 9 of these as follows: Base Ten, Directed Numbers, Extending the set of Counting Numbers, Fractions, Frames, Inequalities, Math Sentence, Perimeter of Rectangles, and Signed Numbers)	4	10	1
6	2	6	6	Dollars and Cents Flannelboard Kit	6	7	1
9	2	7	1	Flannel Board Letters and Numbers	10	8	1
7	2	2	8	Operations on Sets (flannelboard)	4	5	2
9	1	4	6	Expanded Notation Cards (flannel-board)	6	7	1
8	1	3	6	Reading Whole Numbers	9	3	0
11	3	3	2	Fraction pieces (flannelboard)	12	5	0

Category 9 - Manipulative Materials

This category includes all the mathematics materials which can be manipulated by students.

Versatility Rating					Desirability Rating		
3	12	5	0	Double value flash cards (4 operations)	15	4	0
1	0	3	15	Centimeter rods	2	2	0
7	1	12	0	Abacounter	13	5	2
7	1	10	1	Large abacounter (demonstration size)	10	7	1
3	1	2	14	Burns boards	1	3	2

Category 9 - Manipulative Materials (cont'd.)

Versatility Rating					Desirability Rating		
3	0	2	14	Large Burns boards (demonstration size)	1	2	2
1	1	7	10	Perimeter-area boards (Ideal)	4	4	0
3	14	2	1	Student flash dials	9	9	1
1	4	0	14	Large flash dial (demonstration size)	2	4	1
1	1	3	12	New math number frame	1	1	4
4	1	4	10	Perimeter-area kit (with square grids, from Learning Laboratories)	3	6	0
16	1	0	3	Primary shapes (plastic)	8	8	1
13	0	1	6	Geometric figures & solids set (wooden)	8	6	0
9	2	1	8	Plastic Tangrams	4	9	0
3	11	5	1	Related facts flash cards (4 operations)	10	7	2
4	14	2	0	Self checking basic facts sheets	15	4	1
2	0	11	6	Cubic inch blocks	12	2	0
4	2	10	3	Individual number lines (wipe-off type)	10	6	0
6	2	7	5	Magnetic boards	6	9	0
3	0	5	10	Math frame (Ideal)	0	6	3
11	2	5	1	Place value board	8	8	1
8	1	7	3	Equivalent fraction board	10	6	1
9	2	6	2	Fraction pieces (Judy)	10	6	1
5	1	7	6	Fraction pies (sponge rubber ones) (wooden boxes)	4	5	2
3	2	12	3	Balance (Invicta)	9	7	2
5	1	6	8	Geo-boards	8	5	0
3	1	3	11	Volume relationship kit (Junior high - cone-cylinder-sphere-etc.)	7	1	0
4	1	2	11	Weights-springs (Junior high - Madison Project materials)	5	1	2
4	1	1	12	Magic design maker	0	4	2
3	0	5	11	Chalkboard T-square, compass, and protractor	6	2	0

Category 10 - Commercially prepared materials

This category is designed to include materials which are in most cases consumed and in all cases are used by students.

Versatility Rating					Desirability Rating		
3	11	5	1	SRA Computational Skills Developmental Kit	11	7	1
2	12	4	2	Student SRA books	7	10	1

Versatility Rating					Desirability Rating		
3	11	3	3	SRA Cross number puzzle kit	8	8	1
0	4	2	12	SRA decimals and percents cross number puzzle kit	2	3	1
0	4	2	12	Student books to accompany decimals and percents SRA kit	2	3	1
2	4	6	7	Programmed books (Fractions I and Fractions II, Decimals and Percents)	4	5	3
4	10	5	0	Double value flash cards (4 operations)	13	5	1
4	1	14	0	Math enrichment books (for example: Fun With Math, Going Places with Math, Golden Book of Math, Magic House of Numbers, The Math Wizard, Yes, Math Can Be Fun, etc.)	15	4	0
5	3	4	7	Rubber stamps (circle, protractor, and ruler)	4	8	1
1	2	13	3	Copies of textbooks presently used in C.P.S.	7	4	4
1	3	6	8	Scholastic Services Self Teaching Arithmetic Books	4	3	3
5	3	7	3	Bulletin Board letters	15	2	0
2	2	15	0	Commercially-made ditto masters	11	6	2
2	8	6	3	Cross number puzzles (wipe-off kind from Ideal)	6	8	2